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A sub-mm imaging survey of ultracompact HII regions

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Abstract. We present the preliminary results of a sub-mm imaging survey of ultracompact HII regions, conducted with the SCUBA bolometer array on the JCMT.

1. Introduction

Ultracompact (UC) HII regions are currently the best known tracer of massive YSOs and represent the earliest confirmed stage of massive star formation. In excess of 150 UC HII regions have been detected, mainly by radio surveys. Whilst the environments of UC HII regions are known very well on the small scale (a few arcseconds) they are not well known on scales over $40''$. This is because most UC HIIs have, to date, been observed using either interferometers (to gain information on small scales at the expense of large scales) or by single-position large-beam (typically $40''$ or worse) spectroscopy. To redress this issue we recently undertook an imaging survey of over 100 UC HII regions using SCUBA on the JCMT, which enables us to rapidly map (with high resolution) the dust emission from the clumps in which the UC HIIs are embedded.

2. The survey

SCUBA is mainly comprised of two bolometer arrays which (almost) instantaneously sample a $2'$ field simultaneously at 450 and 850 μm. The instrument is very sensitive, with the results that we were able to image each UC HII down to a 1σ noise level of typically 50 mJy at 850 μm in only 3 minutes. Our source sample was drawn from the UC HII region catalogues of Wood & Churchwell

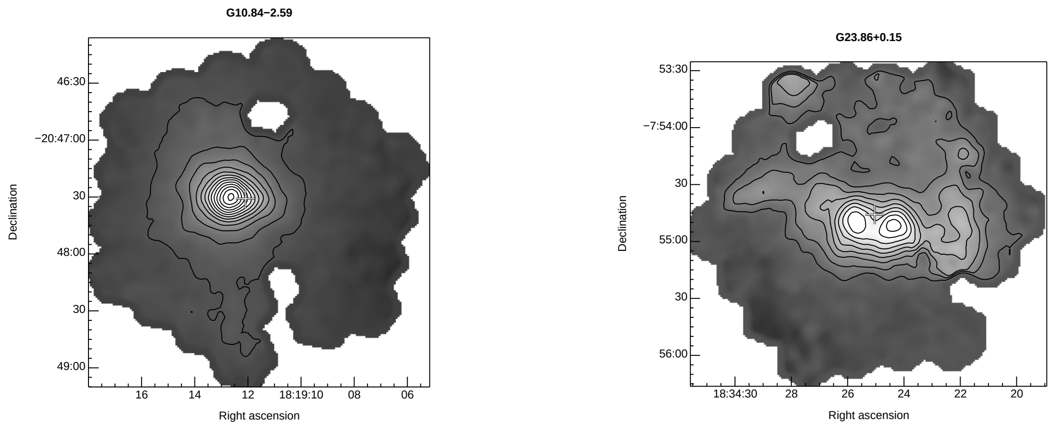

Figure 1. 850 μm images from the survey. Crosses mark the locations of the UC HII regions. Holes in the image are removed noisy pixels.

(1989) and Kurtz, Churchwell & Wood (1994), comprising some 140 UC HII regions in all. Our motivations for the survey were to *i)* investigate the large-scale structure of the dust clumps embedding the UC HIIs; *ii)* fill the existing gap in the spectral energy distribution at sub-mm wavelengths; *iii)* search for other unknown dust clumps in the field of view, possibly harbouring massive YSOs or protostars in different evolutionary states and *iv)* identify hot molecular cores via their strongly peaked sub-mm emission (Hatchell et al. 2000).

3. Preliminary results

In total we observed 106 out of the 140 UC HII regions in the catalogues. Sub-mm emission was detected in 80% of the sample. The morphology of the dust clumps is surprisingly linear: over half of the singly-peaked clumps are elongated along one axis (e.g. G10.84 in Fig. 1) and over half of multiply-peaked clumps take the form of cores string along a ridge (e.g. G23.96 in Fig. 1). We also identified a large number of previously unknown dust clumps in the field of view, many of which are not associated with radio continuum or embedded IR sources and may contain massive protostars in an earlier stage to that of the UC HII (see Gibb et al., this proceedings for details of BIMA follow-up observations). In addition we identified 15 UC HIIs associated with strongly peaked sub-mm continuum which may contain hot molecular cores.

References

Hatchell, J., Fuller G.A., Millar, T.J., Thompson, M.A., Macdonald, G.H. 2000, A&A, 357, 637

Kurtz, S., Churchwell, E., Wood, D.O.S 1994, ApJS, 91, 659

Wood, D.O.S., Churchwell, E. 1989, ApJS, 69, 831